

**60V NPN LOW SATURATION MEDIUM POWER TRANSISTOR IN SOT89**

**Features**

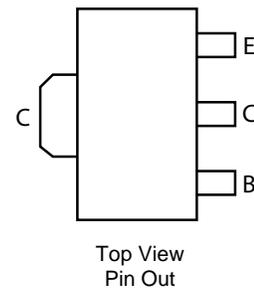
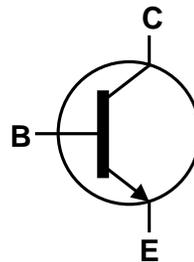
- $BV_{CEO} > 60V$
- $I_C = 5A$  High Continuous Current
- $R_{SAT} = 30m\Omega$  for a Low Equivalent On-Resistance
- Low Saturation Voltage  $V_{CE(SAT)} < 65mV @ I_C = 1A$
- $h_{FE}$  Specified Up to 10A for High Current Gain Hold Up
- Complementary PNP Type: ZXTP2012Z
- **Lead-Free Finish; RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

**Mechanical Data**

- Case: SOT89
- Case Material: Molded Plastic. "Green" Molding Compound.
- UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208
- Weight: 0.05 grams (Approximate)

**Application**

- Emergency Lighting Circuits
- Motor Driving (including DC Fans)
- Backlight Inverters
- Power Switches
- Gate Driving MOSFETs and IGBTs

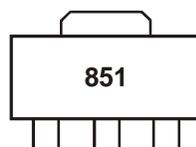


**Ordering Information (Note 5)**

Product	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
ZXTN2010ZTA	AEC-Q101	851	7	12	1,000
ZXTN2010Z-13R	AEC-Q101	851	13	12	4,000
ZXTN2010ZQTA	Automotive	851	7	12	1,000

- Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  4. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to [http://www.diodes.com/quality/product\\_compliance\\_definitions/](http://www.diodes.com/quality/product_compliance_definitions/).
  5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

**Marking Information**



851 = Product Type Marking Code

### Maximum Ratings (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CB0</sub>	150	V
Collector-Emitter Voltage	V <sub>CEO</sub>	60	V
Emitter-Base Voltage	V <sub>EBO</sub>	7	V
Continuous Collector Current	I <sub>C</sub>	5	A
Peak Pulse Current	I <sub>CM</sub>	20	A

### Thermal Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

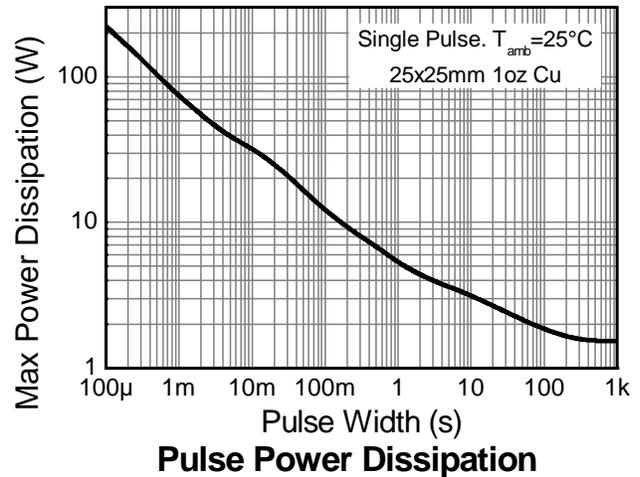
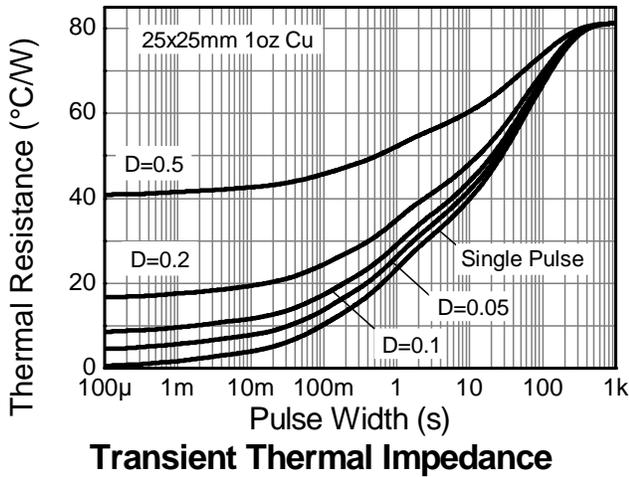
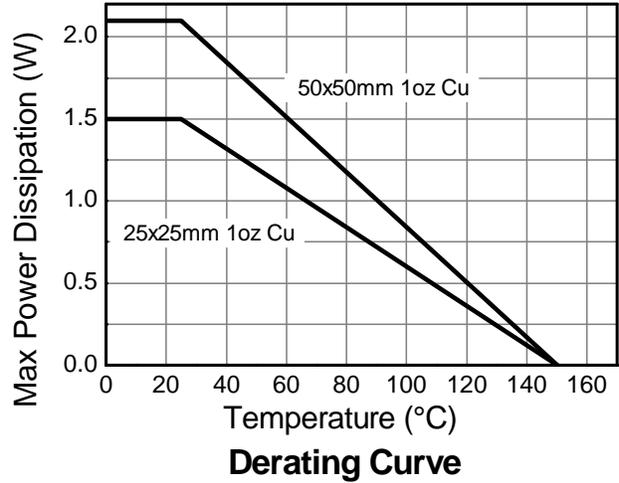
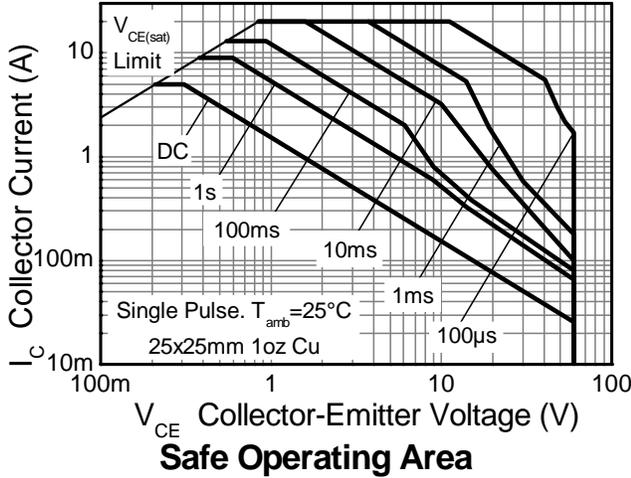
Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6) Linear derating factor	P <sub>D</sub>	1.5 12	W mW/°C
Power Dissipation (Note 7) Linear derating factor	P <sub>D</sub>	2.1 16.8	W mW/°C
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	83	°C/W
Thermal Resistance, Junction to Ambient (Note 7)	R <sub>θJA</sub>	60	°C/W
Thermal Resistance, Junction to Leads (Note 8)	R <sub>θJL</sub>	3.23	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

### ESD Ratings (Note 9)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	≥ 4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	≥ 400	V	C

- Notes:
6. For a device mounted with the exposed collector pad on 25mm x 25mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
  7. Same as note (6), except the device is mounted on 50mm x 50mm 1oz copper.
  8. Thermal resistance from junction to solder-point (on the exposed collector pad).
  9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

**Thermal Characteristics and Derating Information**

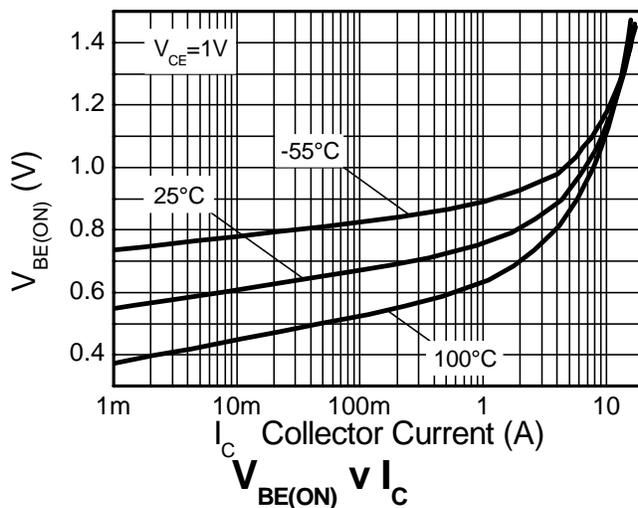
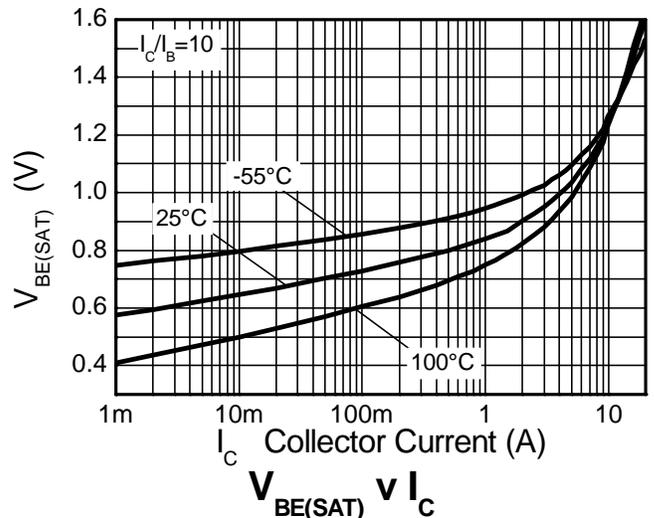
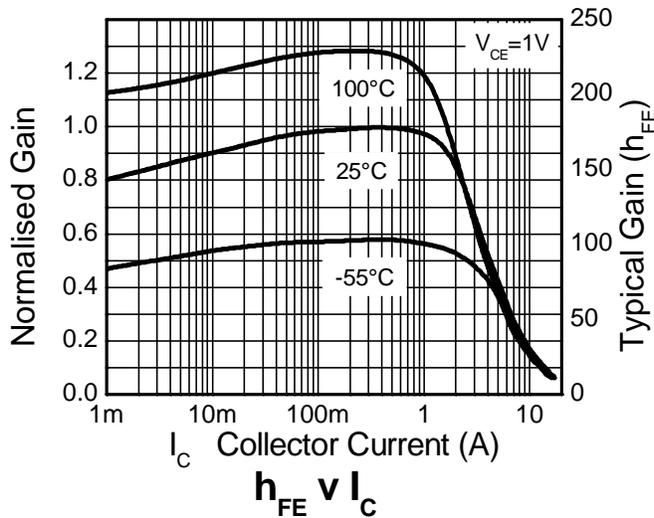
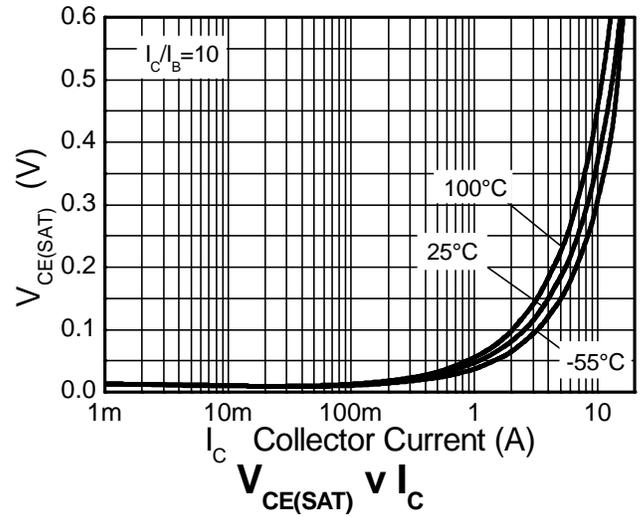
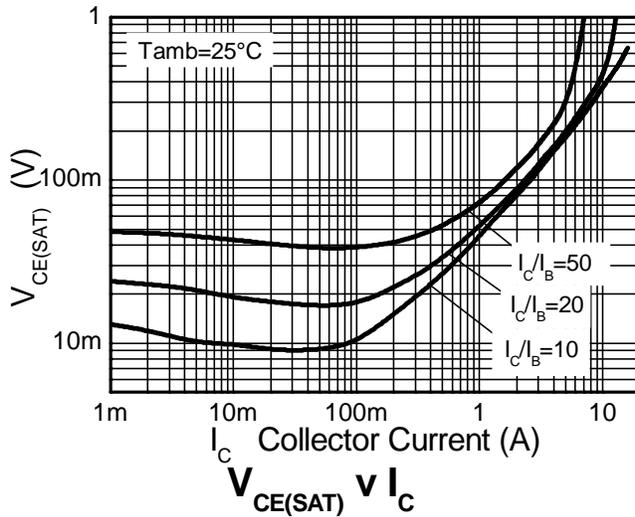


**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CB0</sub>	150	190	—	V	I <sub>C</sub> = 100μA
Collector-Emitter Breakdown Voltage (Note 10)	BV <sub>CER</sub>	150	190	—	V	I <sub>C</sub> = 1μA, R <sub>B</sub> ≤ 1kΩ
Collector-Emitter Breakdown Voltage (Note 10)	BV <sub>CEO</sub>	60	80	—	V	I <sub>C</sub> = 10mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	7	8.1	—	V	I <sub>E</sub> = 100μA
Collector Cutoff Current	I <sub>CBO</sub>	—	< 1	50 500	nA nA	V <sub>CB</sub> = 120V V <sub>CB</sub> = 120V, T <sub>A</sub> = +100°C
Collector Cutoff Current	I <sub>CER</sub> R ≤ 1kΩ	—	< 1	100 500	nA nA	V <sub>CB</sub> = 120V V <sub>CB</sub> = 120V, T <sub>A</sub> = +100°C
Emitter Cutoff Current	I <sub>EBO</sub>	—	< 1	10	nA	V <sub>EB</sub> = 6V
DC Current Transfer Static Ratio (Note 10)	h <sub>FE</sub>	100	200	—	—	I <sub>C</sub> = 10mA, V <sub>CE</sub> = 1V
		100	200	300		I <sub>C</sub> = 2A, V <sub>CE</sub> = 1V
		55	105	—		I <sub>C</sub> = 5A, V <sub>CE</sub> = 1V
		20	40	—		I <sub>C</sub> = 10A, V <sub>CE</sub> = 1V
Collector-Emitter Saturation Voltage (Note 10)	V <sub>CE(SAT)</sub>	—	17	30	mV	I <sub>C</sub> = 100mA, I <sub>B</sub> = 5mA
		—	35	55		I <sub>C</sub> = 1A, I <sub>B</sub> = 100mA
		—	40	65		I <sub>C</sub> = 1A, I <sub>B</sub> = 50mA
		—	90	125		I <sub>C</sub> = 2A, I <sub>B</sub> = 50mA
		—	170	230		I <sub>C</sub> = 6A, I <sub>B</sub> = 300mA
Base-Emitter Saturation Voltage (Note 10)	V <sub>BE(SAT)</sub>	—	970	1100	mV	I <sub>C</sub> = 6A, I <sub>B</sub> = 300mA
Base-Emitter Turn-on Voltage (Note 10)	V <sub>BE(ON)</sub>	—	910	1050	mV	I <sub>C</sub> = 6A, V <sub>CE</sub> = 1V
Transitional Frequency	f <sub>T</sub>	—	130	—	MHz	I <sub>C</sub> = 100mA, V <sub>CE</sub> = 10V, f = 50MHz
Output Capacitance	C <sub>obo</sub>	—	31	—	pF	V <sub>CB</sub> = 10V, f = 1MHz,
Switching Time	t <sub>ON</sub>	—	42	—	ns	V <sub>CC</sub> = 10V, I <sub>C</sub> = 1A, I <sub>B1</sub> = I <sub>B2</sub> = 100mA
	t <sub>OFF</sub>	—	760			

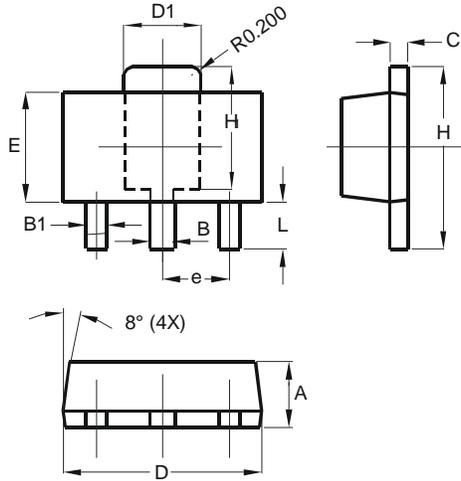
Note: 10. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

**Typical Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)



## Package Outline Dimensions

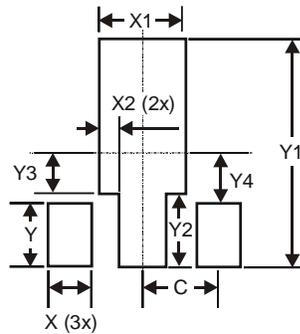
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



SOT89		
Dim	Min	Max
A	1.40	1.60
B	0.44	0.62
B1	0.35	0.54
C	0.35	0.44
D	4.40	4.60
D1	1.62	1.83
E	2.29	2.60
e	1.50 Typ	
H	3.94	4.25
H1	2.63	2.93
L	0.89	1.20
All Dimensions in mm		

## Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



Dimensions	Value (in mm)
X	0.900
X1	1.733
X2	0.416
Y	1.300
Y1	4.600
Y2	1.475
Y3	0.950
Y4	1.125
C	1.500

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